PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference P200200531WO	FOR FURTHER ACTION See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)	
International application No. PCT/DK 03/00213	International filing date *(day/month/year)* 02.04.2003	Priority date *(day/month/year)* 03.04.2002
International Patent Classification (IPC) or both national classification and IPC H01S5/14		
Applicant ESKO-GRAPHICS A/S		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 6 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 5 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the opinion
   - II ☐ Priority
   - III ☐ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Rule 66.2(a)(ii) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☐ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
20.10.2003	25.08.2004
Name and mailing address of the international preliminary examining authority: European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016	Authorized Officer Claessen, L Telephone No. +31 70 340-3448

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/DK 03/00213

I. Basis of the report

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:

Description, Pages

1-65 as originally filed

Claims, Numbers

1-18 received on 08.06.2004 with letter of 03.06.2004

Drawings, Sheets

1/10-10/10 as originally filed

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).

   ☐ the language of publication of the international application (under Rule 48.3(b)).

   ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   ☐ contained in the international application in written form.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority in written form.

   ☐ furnished subsequently to this Authority in computer readable form.

   ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.

   ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   ☐ the description, pages:

   ☐ the claims, Nos.:

   ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)).

   (Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-18
	No:	Claims	
Inventive step (IS)	Yes:	Claims	6,12,13
	No:	Claims	1-5,7-11,14-18
Industrial applicability (IA)	Yes:	Claims	1-18
	No:	Claims	

2. Citations and explanations

see separate sheet

Re Item V

Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

Reference is made to the following document/s/:

D1: US-B-6 212 2161 (PILLAI RAMADAS M R) 3 April 2001 (2001-04-03)

D2: US-A-4 995 050 (WAARTS ROBERT G ET AL) 19 February 1991 (1991-02-19)

CLAIM 1

novelty:

D2 which is considered as the closest prior art discloses (see in particular figures 2-6, and column 3 lines 49-55, and column 4 lines 22-44) a laser (diode) system comprising a first surface with a density distribution around the optical axis (19 and column 3 lines 15-20, column 4 lines 22,23) , the light beam comprising a plurality of spatial modes (m, m+1 etc) corresponding to an emission angle, a first selection means (mirror stripe 33 in figure 5), this striped mirror acts both as a spatial selection device (like an aperture) and as a reflective member, for selecting a first part of the emitted light corresponding to a spatial mode at a first emission angle on a first side of the optical axis, a reflective member (33) to reflect a feedback fraction back into the laser diode, and as such defining a first external cavity. The reflective member 33 produces a first output. Furthermore D1 discloses a second selection means and reflective member (31) defining a second external cavity.

The subject matter of claim 1 differs from D2 in that the second reflective member produces a second output, claim 1 is as such new (Art 33(2) PCT).

Inventive step (lack of)

This difference allows a second output which can either be used in a similar way as the first output or can be used for ease of monitoring and/or adjusting the laser system. It is however suggested in D1 that (see column 3 line 55) the reflectivity of this second reflective member can be lowered. For the skilled man this means obviously that some light will be emitted by the member in transmission, and as such the idea of having two outputs with its advantages is suggested to the skilled man . Therefore the technical feature of having two outputs instead of one is not inventive in view of the teachings of D2, contrary to the demands of Art 33(3) PCT. Claim 1 is therefore not inventive.

CLAIM 12

Novelty

D2 which is considered as the closest prior art discloses (see in particular figures 2-6, and column 3 lines 49-55, and column 4 lines 22-44) a laser (diode) system comprising a first surface with a density distribution around the optical axis (19 and column 3 lines 15-20, column 4 lines 22,23) , defining a plane of low coherence and a plane of high coherence (slow and fast axes, as can be deduced from figure 1) , the light beam comprising a plurality of spatial modes (m, m+1 etc) corresponding to an emission angle in the plane of low coherence (parallel to the laser stripe, the slow axis), a first selection means (mirror stripe 33 in figure 5), this striped mirror acts both as a spatial selection device (like an aperture) and as a reflective member, for selecting a first part of the emitted light corresponding to a spatial mode at a first emission angle on a first side of the optical axis in said plane of low coherence.

The subject matter of claim 1 differs from D2 in that the second selective member is present in the a plane across the low coherence plane, i.e in the high coherence plane. This second selective member plus a reflective member define a second external cavity. Claim 12 is as such new (Art 33(2) PCT).

Inventive step

This difference allows even better mode selection to even optimise the mode pattern of the laser in this fast direction. The prior art does not disclose or suggests any mode selection in the high coherence plane, as normally this coherence does not present a problem, as the beam quality M^2 is already acceptable. Therefore in wanting to optimise the devices of prior art D1 or D2 the skilled man would never think of a selection means in the high coherence plane, which would also be very complicated, without exercising an inventive step.

Claim 12 is as such inventive (Art 33(3) PCT).

CLAIM 13

None of the related prior art (D1 or D2) disclose or fairly suggest a method of aligning a laser system as disclosed in said documents by activating one at the time the first or second reflective member. Method claim 13 is as such new and inventive (Art 33(2) (3) PCT).

DEPENDENT CLAIMS 2-11,14-18

Inventive step, lack of

Claims 2,3,5,7-11,14-18 present minor device alternatives, or applications known to the skilled man. These claims are therefore not inventive.

Claim 4: It is known to the skilled man that a spatial selection means at the Fourier diffraction plane as in a device of D1 (see for instance D1 column 5 line 55, the diffraction plane is the plane formed by facets 43 and 54 in figure 4a) is a very effective means for mode selection. When trying to improve the mode selection of D2 the skilled man would study D1 and modify the device of D2 accordingly. Therefore claim 4 is not inventive.

inventive step

Claim 6: In this claim a third selection means is present in the a plane across the low coherence plane, i.e in the high coherence plane. The arguments used in favour of claim 12 apply mutatis mutandis to claim 6.

A claim made of Claim1 and claim 6 would therefore be new and inventive according to Art 33(2) and 33(3) PCT.